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(19)

(54) IMPROVEMENTS IN OR RELATING TO VEHICLE WINDOW WIPERS

(71) We, CHRYSLER UNITED KINGDOM LIMITED, a British Company, of Bowater House, 68 Knightsbridge, London SW1X 7LH, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to vehicle window wipers and is particularly although not exclusively applicable to wipers for openable rear windows of vehicles.

The invention provides a vehicle window wiper comprising a drive shaft having a wiper blade assembly at one end thereof, means to mount the shaft for rotary movement, drive means for the shaft, a coupling for transmitting rotary motion from the drive means to the shaft, said coupling being engageable and disengageable by relative movement of the drive means and shaft in the axial direction of the shaft, and means to lock the shaft against rotation in the mounting means automatically on disengagement of the coupling and to release said shaft for rotation on engagement of the coupling.

More specifically, the drive means may be located adjacent the other end of the drive shaft, and the coupling may comprise a first annular element driven by the drive means and having a ring of teeth and a second annular element on said other end of the drive shaft having a ring of teeth for engagement with the teeth of the first element, the teeth of the two rings being engaged and disengaged by relative axial movement of the shaft towards and away from the driving means respectively.

In the latter arrangement the second annular element may be mounted for axial sliding movement along the shaft, the second element may be biased towards the other end of the shaft by spring means and said locking means being engaged by movement of the second element towards said other end of the shaft and being released by movement of th second element in the opposite direction when engaged by the said first element.

The locking means may comprise a further ring of teeth on the second element and a ring of fixed teeth on the mounting means or a part secured thereto, said fixed teeth being arranged to be engaged by the further teeth of the second element on movement of the element towards said other end of the shaft.

In one specific embodiment, the fixed teeth are formed on the inner periphery of a sleeve attached to the mounting means and extending concentrically with the shaft towards said other end of the shaft and the further teeth of the second element are formed around the outer periphery of the element.

In alternative embodiment, the mounting means for the shaft comprise a tubular member supporting the shaft at an intermediate position in its length, the fixed teeth are provided on the outer periphery of the tubular member adjacent the other end of the shaft and the further ring of teeth on the second element are formed around the inner periphery of a sleeve projecting co-axially around the shaft adjacent the tubular member.

In a further embodiment of the invention the coupling between the drive means and the shaft comprises a frusto-conical member and a frusto-conical socket to receive the member.

Preferably the member has axially-extending teeth spaced around the outer periphery thereof and the socket has axially extending slots spaced around the surface thereof to receive the teeth.

It is further preferred that the frusto-conical member is driven by the drive means and the frusto-conical socket is secured to said other end of the shaft for engagement with the member.

The lock means for any of the latter arrangements may comprise at least one detent moving with the shaft and spring biased into engagement with a toothed ring

fixed in th mounting means, th d tent being released from the toothed ring by engagement of th frusto-conical member in the socket.

Th arrangem nts referred to above are particularly applicable to opening rear windows of motor vehicles in which the window is opened by hinging about an axis along one edge in which case the mounting means of the shaft are located in the window adjacent the opposite edge thereof with the wiper on the outer side of the window and the coupling on the inner side of the window and the drive means are mounted on the inside of the vehicle body adjacent said opposite edge of the window, the drive means being arranged to oscillate the drive shaft so that the wiper blade moves through an arcuate path on the outside of the window.

The following is a description of some specific embodiments of the invention, reference being made to the accompanying drawings in which:—

Figure 1 is a part sectioned, part side elevation of a window wiper arrangement showing the components thereof in an operative position;

Figure 2 is a similar view to Figure 1 but showing the components in an inoperative position;

Figure 3 is a part sectioned, part side elevation of a second arrangement in an operative position;

Figure 4 is a similar view to Figure 3 showing the arrangement in an inoperative position;

Figure 5 is a part sectioned, part side elevation of a third arrangement in an operative position;

Figure 6 is a similar view to Figure 5 showing the arrangement in an inoperative position, and

Figure 7 is a forward looking view of a motor car rear window having a window wiper arrangement according to the invention.

Referring firstly to Figures 1 and 2 there is shown a window wiping arrangement for a vehicle openable rear window glass 10. The arrangement comprises a spindle housing having an elongate boss 11 with a bore 12. Part-way along the boss there is a radially extending flange 13 having a peripheral portion 14 and an annular rim 15 axially offset from the flange to form a shoulder 16, the rim and the flange defining a recess 17 and the peripheral portion having screw threads 18 for a purpose to be described later.

The upper end of the boss 11 towards which the rim 15 is offset has external screw threads 19 and passes through, and protrudes from a hole 20 in the window 10 adjacent the lower openable edge thereof to permit abutment of the edge of the rim 15 with the inside of the window such that th axis of the bore in th boss is normal to the plan of th window. An escutcheon plate 21 engages over the protruding nd of the boss 11, th plate having a peripheral portion in abutment with the exterior surface of the window on the opposite side to that which the edge of rim 15 abuts. The peripheral portion of the plate encircles a central recess provided for a purpose described later. The spindle housing and escutcheon are secured to the window 10 by a nut 22 engaged over the screwed end of the boss and in abutment with the upper face of the escutcheon plate. A handgrip 23 for opening of the window is formed integrally with the escutcheon and an annular sealing element of soft material e.g. lead, is located in the hole 20 between the window and the boss 11, the ends of the sealing element being deformable on assembly to occupy part of the recess in the escutcheon and recess 17 in the spindle housing.

A wiper arm spindle 25 is rotatable within the bore 11 of the housing boss and the upper end of the spindle extending from the end of the boss has splines 26 over which engages one end 27 of a spring loaded wiper arm 28 which is releasably attached to the spindle end for rotation therewith in a manner known per se. A wiper blade assembly (not shown) is attached to the other end of the arm and is in wiping contact with the exterior surface of the window. Axial movement of the spindle 25 relative to the boss 12 is prevented by a transversely directed pin 29 located in a hole in the boss and engaging into a circumferential groove in the spindle.

The end of the spindle remote from the wiper arm connection also extends from the end of the boss and terminates in a screw-threaded end. Adjacent said screw threaded end, the spindle has splines 30 over which slidably engages a correspondingly splined boss of an axially movable clutch member 31 having a circular base portion 32 from the peripheral edge of which extends a short axially directed annular wall terminating in a radially outwardly directed annular flange 33 on the periphery of which are formed radially extending dog teeth 34. Similarly, circumferentially spaced axially facing dog teeth 35 are formed in the lower face of the circular base 32 intermediate the peripheral portion thereof.

The peripheral edge of the clutch member flange 33 is enclosed by an annular housing 36 but is free to move axially a limited amount therein. One end of the housing 36 is internally screw-threaded and engages the corresponding screwed threads 18 on the spindle housing and the other end of the housing 36 terminates in an inwardly directed annular flange 37 which overlaps

with th clutch member flange 33 to prevent th clutch m mber 31 from coming off the spindl 25. The inn r face of th housing flange 37 in opposed relationship to the dog teeth 34 has corresponding teeth 38 into which teeth 34 can be engaged under the action of a coiled compression spring 39 interdisposed between the flange 13 of the spindle housing and the opposing face of the clutch member to urge the clutch member towards the flange 37. An elongate domed nut 40 which may be of plastics material is engaged on to the screwed end of the spindle 25 and acts as a centralising device for alignment of the driven window mounted parts of the arrangement and the driving vehicle body mounted parts.

A driven gear wheel 41 is rotatably mounted within a casing 42 which is attached to a mounting bracket 43 secured to a part of the vehicle body 44 adjacent the lower edge of the rear window aperture such that the drive wheel 41 and the spindle 25 have a common axis. One end of the boss of the drive wheel is extended towards the axial movable clutch member 31 and terminates in an annular element 45 located externally of the casing 42 and having radially extending axially facing teeth 46 in corresponding opposed relationship to the teeth 35 on the peripheral portion of the base of the clutch member 31 for driving engagement therewith when the rear window is closed and secured.

Rotational movement of the drive wheel first in one direction and then the other to impart the required oscillating movement of the wiper arm is effected by a well known arrangement comprising engagement of the toothed wheel with a helically toothed elongate member 47 having reciprocal movement within a suitably apertured conduit 48 the reciprocal movement of the member being effected by electric motor driven means 49 as can be seen in Figure 7 in a manner known per se.

From the foregoing, it can be understood that when the vehicle rear window is closed as shown in Figure 1 and secured by latching or locking means (not shown) the teeth 46 of the drive wheel element are normally placed into full driving engagement with the corresponding teeth 35 on the clutch member 31 and the driving element simultaneously moves the clutch member 31 axially along the splines 30 of the spindle 25 against the pressure of the spring a sufficient distance to ensure complete disengagement of the teeth 34 in the flange 33 of the clutch member from the teeth 38 on the flange 37 of the housing 36. In the event that slight rotational misalignment of the clutch member 31 with the drive wheel element causes teeth 35 and 46 to abut after the window has been closed, the pressure of the spring 39 on the clutch member 31 will effect full driving engagem nt of the teeth 35 and 46 after slight relative rotational movem nt between the drive wheel element and the clutch member.

With the window opened sufficiently to completely disengage the drive clutch teeth 35 and 46, the pressure of the spring 39 will act upon the clutch member 31 to move it axially towards the flange 37 of the housing 36 to urge teeth 34 into engagement with teeth 38 on the flange 37 thus locking the spindle and hence the wiper arm against relative rotational movement about the spindle housing.

A normally open switch may be incorporated in the wiper motor electrical circuit and located either on or adjacent the driving part of the wiper arrangement on the vehicle body so that opening the window opens the switch and breaks the wiper motor circuit and closing the window closes the switch and completes the circuit.

In a further embodiment as shown in Figures 3 and 4 the spindle housing 50 and escutcheon plate 51 are mounted on the window 10 and sealed in an identical manner to the first embodiment. The end 27 of the wiper arm 28 is also mounted on the upper end of the spindle 52 in a similar manner to that previously described. The spindle housing flange 53, peripheral portion 54, rim 55 and recess 56 are also identical to the first embodiment except that the screw threads 18 of the first embodiment are replaced by outwardly directed circumferentially spaced teeth 57. Relative axial movement of the spindle is prevented by the same pin 29 and circumferential groove arrangement as in the first embodiment.

The lower end of the boss 58 of the spindle housing 50 terminates adjacent the underside of the flange 53 as does the lower end of the spindle 52 to which a disc-like clutch member 60 is secured having a deep frusto-conic recess 59 therein which is coaxial with the spindle 52. Axially extending slots 61 are spaced circumferentially around the inside surface of the recess for a purpose which is described later.

Two diametrically opposed bell-crank pawl levers 62 are pivotably mounted on opposed sides of the clutch member for rotation about pins 63, arranged so that they pivot in a common plane passing through the spindle axis. The ends 64 of limbs 65 of the pawl levers extend through apertures in the clutch member 60 and the extremities 66 of the pawl levers have inwardly facing teeth thereon. Springs 68 bias the toothed ends of the pawl levers inwardly towards the spindle axis to engage between the teeth 57 on the spindle housing and thereby prevent

rotation of the lutch member 60 and hence th spindle 52 and wiper arm 28 relative t the spindl housing.

The driven gear wheel 69 is rotatably mounted within a casing 70 attached to a mounting bracket secured to the vehicle body as in the first embodiment. The wheel 69 now incorporates a larger diameter elongate boss 71 having a bore 72 one end of which is closed by an end wall 73 through which there is a splined aperture 74 through which is slidably engaged a correspondingly splined end 75 of a shaft 76 having a shouldered part 77 which slidably engages within the bore 72. The end of the shaft remote from the splined end terminates in an axially extending frusto-conic element 78 having a radially extending peripheral flange 79. The tapered surface of the frusto-conic element is provided with circumferentially spaced axially directed teeth 80 which, when the window is closed and secured, are placed in driving engagement with the slots 61 in the clutch member recess 59. A coiled compression spring 81 is interdisposed between the shoulder of part 77 on shaft 76 and the end wall 73 to urge the frusto-conic element 78 towards the recess 59 whilst a circlip 81*a* engaging in a circumferential groove adjacent the end of the splined part 75 of the shaft 76 prevents disengagement of the splined end of the shaft 76 from the aperture 74.

Oscillation of the wiper arm is effected by means of the driven worm wheel, helically toothed reciprocating member and electric motor means and electrical circuit exactly as in the first embodiment.

With reference to Figure 3, disengagement of the pawl teeth 68 from the teeth 57 on the spindle housing has been effected by outward rotation of the pawl levers induced by abutment of the ends 64 of the levers on the peripheral flange 79 against the pressure of the spring 81.

In the window-fully-closed position as illustrated in Figure 3 the slots 61 in the frusto-conic recess are in driving engagement with the teeth 80 on the frusto-conic element on the shaft 76, simultaneously the shaft is displaced axially downwards against the pressure of the spring 81 to cater for the "butting" teeth condition described in the first embodiment.

The frusto-conic construction for the driving arrangement also acts as a spigot to centralise the window and body mounted parts during assembly similar to the function of the plastics domed nut 40 of the first embodiment.

When the window is opened sufficiently, the teeth 61 and 80 are disengaged and the ends 64 of the pawl lever are clear of the peripheral flange 79 so that the spring loaded levers rotate towards the spindle axis such that th teeth 68 on the pawl l vers engage between th teeth 57 n the spindle housing to lock the clutch member, and hence th spindle and wiper arm, against rotational movement relative to the spindle housing as described hereinbefore.

Figures 5 and 6 illustrate a third embodiment. The escutcheon plate and nut of the other embodiments are combined in one securing element 82 and a separate hand grip plate 83 is interdisposed between the element 82 and the window 10. Sealing means are provided between hole 20 and the spindle housing 84 which is secured to the window as in the other embodiments. The wiper arm assembly and the method of securing the arm to the end of the spindle 85 are also as before.

The flange 86 on the spindle housing 84 has a peripheral rim to define a shallow annular recess in opposed relationship with the surface of the window, the edge of the flange 86 has a circumferential groove 87 into which engages one end of an annular flexible cover 88 of resilient material e.g. plastics or rubber, which encircles the window mounted mechanism. The end of the elongate boss 89 remote from the wiper arm terminates in an outwardly directed annular flange 90 having circumferentially spaced teeth 90*a* on the periphery thereof and the spindle 85, rotatably engaged in the bore 91 of the housing 84, is restrained from axial movement therewith by a pin and groove arrangement as before.

The end of the spindle extends axially from the flange 90 and boss 89 and terminates in a reduced-diameter screw-thread portion 92 over which engages a domed plastics nut as in the first embodiment. Splines 93 are formed on the spindle adjacent the shoulder defined by the spindle diameter and the reduced diameter of the screw-threaded portion 92 and at the end of the splines adjacent the shoulder there is a circumferential groove 94 into which engages a circlip 95 for retaining a co-axial clutch member 96 on the spindle.

The clutch member 96 comprises at one end adjacent the circlip a disc-like element 97 having a central aperture correspondingly splined to engage over the splines 93 on the spindle such that the clutch member is fast for rotation with, but axially slidable on, the spindle. The face of the disc element 97 adjacent the circlip is formed with radially-directed axially extending circumferentially-spaced teeth 98 as shown. An annular part 99 extends axially from the opposite face of the element 97 on which are formed the teeth 98 and terminates in an inwardly directed annular flange 100, the bore of which is formed with circumferentially spaced teeth 101 for engagement with the teeth 90*a* on the spindle housing flange. Th

diam ter of th annular part 99 is less than that of the disc lement 97 to define a peripheral shoulder on which abuts one end of a coiled compression spring 102, the other end of which abuts the opposed face of the spindl housing flange 86 thus urging the clutch member towards the circlip, such that in the position as shown in Figure 6, the teeth 101 are spring urged into engagement with teeth 90a on the spindle housing flange 90.

As in the first embodiment, the drive gear wheel 103 is rotatably mounted within a casing attached to a mounting bracket secured to a part of the vehicle body, the annular boss 104 of the wheel 103 is extended axially externally of the casing towards the clutch member 96 and terminates in an annular outwardly directed flange having in opposed relationship with the clutch member a face on which are formed axially-extending circumferentially-spaced teeth 105 which when in engagement with teeth 98 on the clutch member provide a driving connection between the spindle 85, and hence the wiper arm, and the electrical motor driven elements similar to those described hereinbefore.

The domed nut forms a spigot which when engaged into the bore of the drive wheel boss 104 acts as a centralising device during assembly of the window mounted parts, and the body mounted parts of the arrangement as described in the first embodiment.

From the foregoing, it will be appreciated that when the window is fully closed, the teeth 98 and 105 are normally in full engagement and the clutch member has been displaced axially towards the spindle housing against the pressure of the coiled spring 102 such that the teeth 101 are disengaged from the teeth 90a on the spindle housing.

When the window is opened sufficiently to fully disengage teeth 98 from teeth 105 on the drive wheel the clutch member is moved axially towards the circlip 95 by the spring 102 such that teeth 101 mesh with teeth 90a thus locking the clutch member and hence the spindle and wiper arm against rotational movement relative to the spindle housing 84.

Whilst the embodiments described hereinbefore specifically relate to a vehicle openable rear window, they can be equally applied to other forms of openable windows as for example a vehicle windscreen. Additionally, various modifications may be made without departing from the scope of the invention as for example by substituting resilient means comprising moulded rubber elements for the coiled compression springs referred to elsewhere in the specification.

It will also be appreciated that in all the embodiments the peripheral edge of the window aperture in the vehicl body is provided with an elongate resilient sealing strip one edg of which sealing engages the opposing surface of the window pane as illustrated for example in Figure 1.

Also, whilst the windows illustrated in Figures 1 to 7 are hinged at the top edge to the vehicle body for pivoting about a horizontal axis extending transversely of the vehicle, the invention is equally applicable to a window hinged at the lower edge for pivoting about a horizontal axis extending transversely of the vehicle, or to a window hinged at the side for pivoting about a vertical, or substantially vertical axis. In all these arrangements, the disconnectable drive mechanism would be located adjacent that edge of the window opposite to, and remote from the hinges about which the window pivots.

WHAT WE CLAIM IS:—

1. A vehicle window wiper comprising a drive shaft having a wiper blade assembly at one end thereof, means to mount the shaft for rotary movement, drive means for the shaft, a coupling for transmitting rotary motion from the drive means to the shaft, said coupling being engageable and disengageable by relative movement of the drive means and shaft in the axial direction of the shaft, and means to lock the shaft against rotation automatically on disengagement of the coupling and to release said shaft for rotation on engagement of the coupling.

2. A vehicle window wiper as claimed in claim 1 wherein the drive means is located adjacent the other end of the drive shaft, and the coupling comprises a first annular element driven by the drive means and having a ring of teeth and a second annular element on said other end of the drive shaft having a ring of teeth for engagement with the teeth of the first element, the teeth of the two rings being engaged and disengaged by relative axial movement of the shaft towards and away from the driving means respectively.

3. A vehicle window wiper as claimed in claim 2 wherein the second annular element is mounted for axial sliding movement along the shaft, the second element being biased towards the other end of the shaft by spring means and said locking means being engaged by movement of the second element towards said other end of the shaft and being released by movement of the second element in the opposite direction when engaged by said first element.

4. A vehicle window wiper as claimed in claim 2 or claim 3 wherein the locking means comprise a further ring of teeth on the second element and a ring of fixed teeth on a mounting means or a part secured

thereto, said fixed teeth being arranged to be ngaged by the furth r teeth of the second elem nt on movement of the element towards said other end of the shaft.

5. A vehicle window wiper as claimed in claim 4 wherein the fixed teeth are formed on the inner periphery of a sleeve attached to the mounting means and extending concentrically with the shaft towards said other end of the shaft and the further teeth of the second element are formed around the outer periphery of the element.

6. A vehicle window wiper as claimed in claim 4 wherein the mounting means for the shaft comprise a tubular member supporting the shaft at an intermediate position in its length, the fixed teeth being provided on the outer periphery of the tubular member adjacent said other end of the shaft and the further ring of teeth on the second element being formed around the inner periphery of a sleeve extending co-axially around the shaft adjacent the tubular member.

7. A vehicle window wiper as claimed in claim 1 wherein the coupling between the drive means and the shaft comprises a frusto-conical member and a frusto-conical socket to receive the member.

8. A vehicle window wiper as claimed in claim 7 wherein the member has axially-extending teeth spaced around the outer periphery thereof and the socket has axially-extending slots spaced around the surface thereof to receive the teeth.

9. A vehicle window wiper as claimed in claim 7 or claim 8 wherein the frusto-conical member is driven by the drive means and the frusto-conical socket is secured to said other end of the shaft for ngag ment with the member.

10. A vehicl window wiper as claimed in any of claims 7 to 9 wherein the locking means comprise at least one detent moving with the shaft and spring-biased into engagement with a toothed ring fixed on the mounting means, the detent being arranged to be released from the toothed ring by engagement of the frusto-conical member in the socket.

11. A vehicle body having an opening rear window in which the window is opened by hinging about an axis along one edge and having a window wiper according to any of the preceding claims wherein the mounting means of the shaft for the wiper are mounted in the window adjacent a second edge of the window opposite said one edge with the wiper on the outer side of the window and a coupling on the inner side of the window and the drive means are mounted on the inside of the vehicle body to engage the drive shaft in the closed position of the window to oscillate the drive shaft so that the wiper blade moves through an arcuate path on the outside of the window.

12. A vehicle window wiper substantially as described with reference to and as illustrated in Figures 1 and 2, Figures 3 and 4 or Figures 5 and 6 of the accompanying drawings.

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Fig. 1.

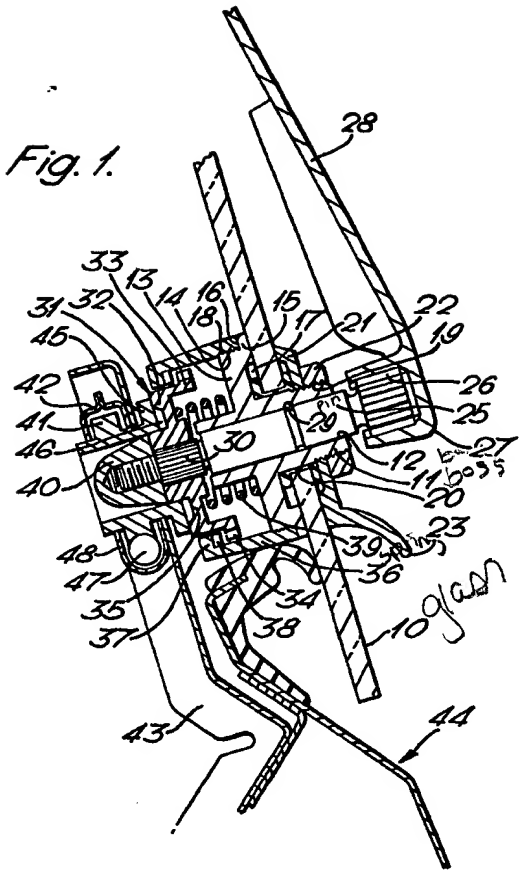

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Fig. 2.

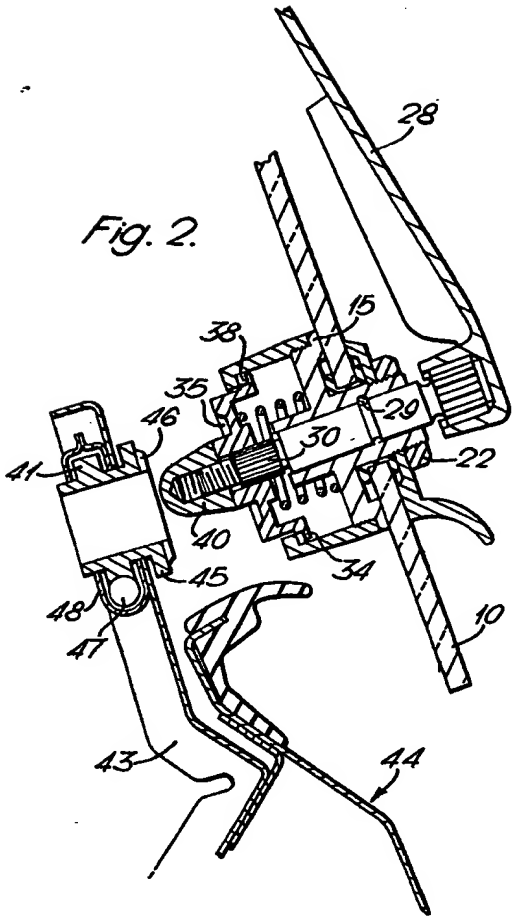

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Fig.3.

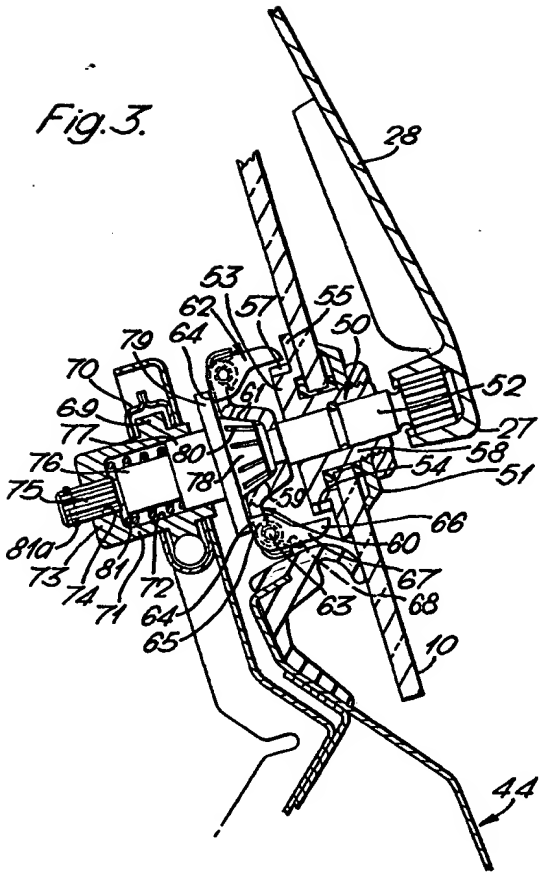

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Fig. 4.

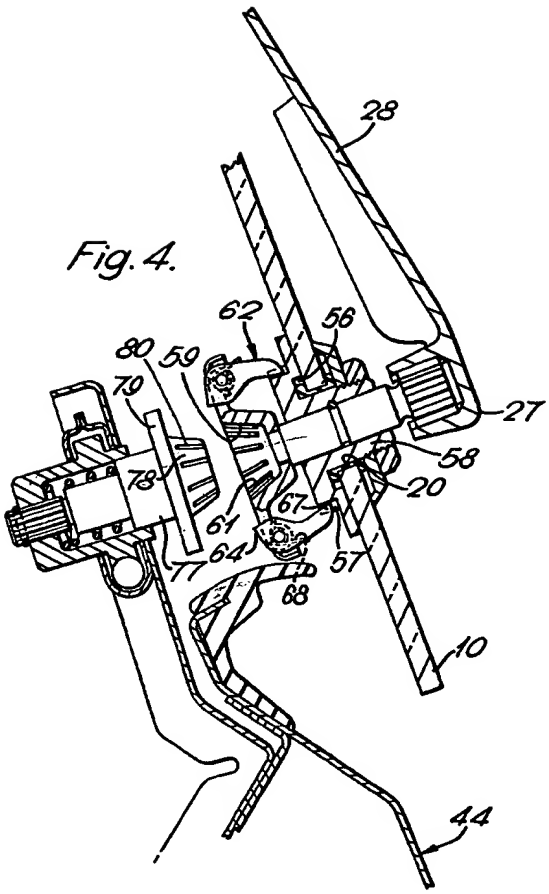

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Fig. 5.

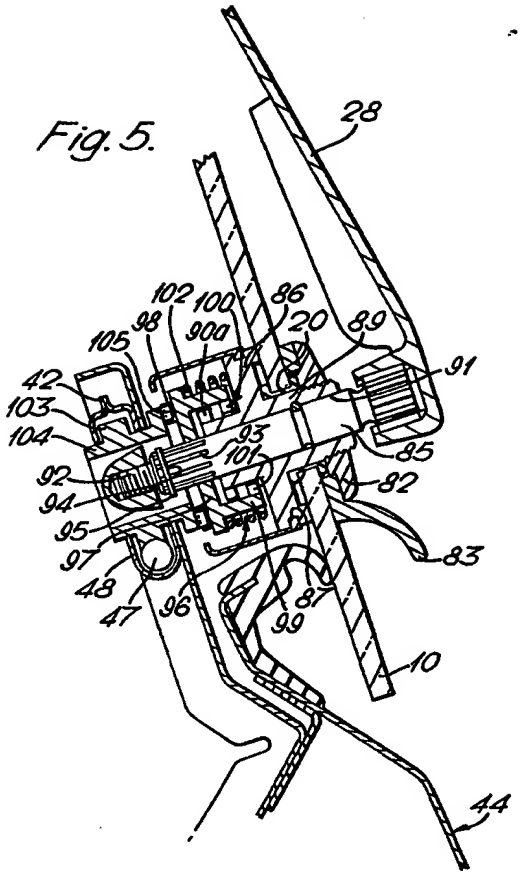

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Fig. 6.

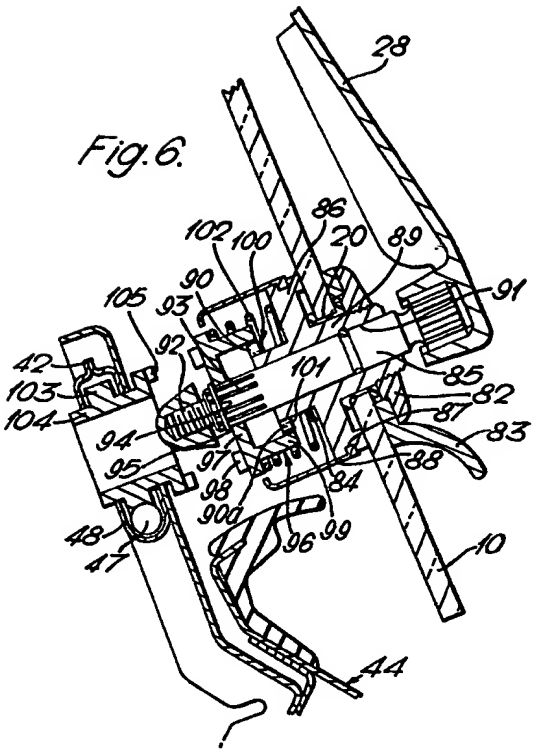

Fig. 7.